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INDEX TO THE REPORTS OF THE

TESTS OF METALS

AND

OTHER MATERIALS

MADE WITH THE

UNITED STATES TESTING MACHINE AT WATERTOWN ARSENAL, MASS.

AND TO THE

REPORTS OF THE UNITED STATES BOARD FOR THE TESTS OF METALS

FROM 1881 TO 1912
BOTH INCLUSIVE

PREPARED UNDER THE DIRECTION OF THE CHIEF OF ORDNANCE, U. S. A.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1913

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Index
1881-1912
176970
Aug. 19, 1913
6137744

INDEX TO TESTS OF METALS, ETC.

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⅝-inch trap	1899	794
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⅝-inch trap	1899	792
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⅝-inch trap	1899	792
Do	1901	600
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⅝-inch trap	1899	793
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Mean compressive strength	1899	740
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0.28 inch diameter, cable	1889	494
0.28 inch diameter, cable, permanent sets during test	1889	531
0.28 inch diameter, cable, tested wet	1889	549
1¾ inches circumference	1891	785
2 inches circumference	1893	436
Do	1897	561, 567
Do	1891	785
2¼ inches circumference	1891	785
2½ inches circumference	1891	785
Do	1893	436
Do	1905	233
Do	1907	105
2½ inches circumference, Russian	1896	475
2¾ inches circumference	1891	785
3 inches circumference	1905	231
Do	1904	291
Do	1905	232
Do	1905	233
Do	1907	105
Do	1891	785
Do	1893	436
Do	1906	175
Do	1904	291
3¼ inches circumference	1884	476
Do	1891	785
3½ inches circumference	1884	476
Do	1905	233
Do	1907	105
Do	1891	785
Do	1893	436
Do	1906	175
3¾ inches circumference	1884	477
Do	1891	785
4 inches circumference	1905	233
Do	1891	785
Do	1893	425
Do	1893	436
4.13 inches circumference	1905	233
4¼ inches circumference	1891	785
4½ inches circumference	1891	785
4¾ inches circumference	1891	785
5 inches circumference	1891	785
5¼ inches circumference	1891	785
5½ inches circumference	1891	785
5¾ inches circumference	1891	785
6 inches circumference	1891	785
Do	1893	425

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Cordage—Continued.		
Linen—		
Descriptive remarks	1889	491
Lengths of strands and threads	1889	580
Shot lines, tensile tests of	1909	1040–42
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Tests of cords, strands, threads, and yarns	1889	576
Do	1895	711
Do	1896	484
Do	1897	482, 566
Do	1905	228, 230
Braided—		
Elongation tests—		
0.13 inch diameter, Smith & Dove linen sail twine	1889	520
0.13 inch diameter, Smith & Dove linen sail twine, permanent sets during test	1889	546
0.14 inch diameter, old unbleached waterproof shot lines	1889	583
0.14 inch diameter, Barbour's linen shoe thread	1889	517
Do	1889	518
0.14 inch diameter, Barbour's gilling thread	1889	519
0.14 inch diameter, Coy linen gilling, 2-ply	1889	516
Do	1889	519
Do	1889	522
0.14 inch diameter, Coy linen gilling, 3-ply	1889	520
Do	1889	521
0.14 inch diameter, Marshall's linen thread	1889	522
0.14 inch diameter, Smith & Dove linen shoe thread	1889	516
0.22 inch diameter, old unbleached waterproof shot lines	1889	585
0.23 inch diameter, Barbour's linen shoe thread	1889	526
0.23 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	544
0.23 inch diameter, Barbour's linen shoe thread, tested wet	1889	552
0.23 inch diameter, Barbour's linen shoe thread, tested after wetting and drying	1889	566
0.23 inch diameter, Coy linen gilling, 3-ply	1889	523
Do	1889	524
0.23 inch diameter, Coy linen gilling, 3-ply, permanent sets during test	1889	541
Do	1889	543
0.23 inch diameter, Coy linen gilling, 3-ply, tested wet	1889	554
0.23 inch diameter, Coy linen gilling, 3-ply, tested after wetting and drying	1889	566
0.23 inch diameter, Marshall's linen thread	1889	528
0.23 inch diameter, Marshall's linen thread, permanent sets during test	1889	547
0.23 inch diameter, Marshall's linen thread, tested wet	1889	551
0.23 inch diameter, Smith & Dove linen sail twine	1889	528
0.23 inch diameter, Smith & Dove linen sail twine, tested wet	1889	551
0.23 inch diameter, Smith & Dove linen sail twine, tested after wetting and drying	1889	565
0.24 inch diameter, Barbour's gilling thread	1889	527
0.24 inch diameter, Barbour's gilling thread, permanent sets during test	1889	545
0.24 inch diameter, Barbour's gilling thread, repeated stress, wet during test	1889	570
0.24 inch diameter, Barbour's linen shoe thread	1889	526

Subject.	Year.	Page.
Cordage—Continued.		
Linen—Continued.		
Braided—Continued.		
Elongation tests—Continued.		
0.24 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	545
0.24 inch diameter, Coy linen gilling, 2-ply	1889	523
Do	1889	524
Do	1889	525
0.24 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	542
0.24 inch diameter, Coy linen gilling, 2-ply, tested wet	1889	553
0.24 inch diameter, Smith & Dove linen shoe thread	1889	527
0.24 inch diameter, Smith & Dove linen shoe thread, permanent sets during test	1889	546
0.25 inch diameter, Barbour's linen shoe thread	1889	525
0.25 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	544
0.25 inch diameter, Barbour's linen shoe thread, tested wet	1889	552
Tensile tests—		
0.13 inch diameter, Smith & Dove linen sail twine	1889	497
0.13 inch diameter, Smith & Dove linen sail twine, permanent sets during test	1889	531
0.14 inch diameter, Barbour's linen shoe thread	1889	497
0.14 inch diameter, Barbour's gilling thread	1889	497
0.14 inch diameter, Coy linen gilling, 2-ply	1889	496
Do	1889	497
0.14 inch diameter, Coy linen gilling, 3-ply	1889	497
0.14 inch diameter, Marshall's linen thread	1889	497
0.14 inch diameter, Smith & Dove linen shoe thread	1889	497
0.16 inch diameter, Smith & Dove sail twine	1889	593
0.17 inch diameter, Smith & Dove sail twine	1889	594
0.22 inch diameter, Silver Lake linen, unbleached	1886	1752
0.22 inch diameter, Sylvan Spring linen, unbleached	1886	1752
0.23 inch diameter, Barbour's linen shoe thread	1889	498
0.23 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	531
0.23 inch diameter, Barbour's linen shoe thread, tested wet	1889	549
0.23 inch diameter, Barbour's linen shoe thread, tested after wetting and drying	1889	561
0.23 inch diameter, Coy linen gilling, 3-ply	1889	497
Do	1889	498
0.23 inch diameter, Coy linen gilling, 3-ply, permanent sets during test	1889	531
0.23 inch diameter, Coy linen gilling, 3-ply, tested wet	1889	549
0.23 inch diameter, Coy linen gilling, 3-ply, tested after wetting and drying	1889	561
0.23 inch diameter, Marshall's linen thread	1889	498
0.23 inch diameter, Marshall's linen thread, permanent sets during test	1889	531
0.23 inch diameter, Marshall's linen thread, tested wet	1889	549
0.23 inch diameter, Smith & Dove linen sail twine	1889	498
0.23 inch diameter, Smith & Dove linen sail twine, permanent sets during test	1889	531
0.23 inch diameter, Smith & Dove linen sail twine, tested wet	1889	549
0.23 inch diameter, Smith & Dove linen sail twine, tested after wetting and drying	1889	561

Subject.	Year.	Page.
Cordage—Continued.		
Linen—Continued.		
Braided—Continued.		
Tensile tests—Continued.		
0.24 inch diameter, Barbour's linen shoe thread	1889	498
0.24 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	531
0.24 inch diameter, Barbour's gilling thread	1889	498
0.24 inch diameter, Barbour's gilling thread, permanent sets during test	1889	531
0.24 inch diameter, Coy linen gilling, 2-ply	1889	497
Do	1889	498
0.24 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	531
0.24 inch diameter, Coy linen gilling, 2-ply, tested wet	1889	549
0.24 inch diameter, Smith & Dove linen shoe thread	1889	498
0.24 inch diameter, Smith & Dove linen shoe thread, permanent sets during test	1889	531
0.24 inch diameter, boat line	1897	565
0.25 inch diameter, Barbour's linen shoe thread	1889	498
0.25 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	531
0.25 inch diameter, Barbour's linen shoe thread, tested wet	1889	549
0.27 inch diameter, Smith & Dove sail twine	1889	592
0.29 inch diameter, hand lead line	1897	565
0.30 inch diameter, distance line	1897	565
0.38 inch diameter, signal halliards	1897	565
3 strands—		
Elongation tests—		
0.11 inch diameter, Coy linen gilling, 2-ply	1889	510
0.12 inch diameter, Coy linen gilling, 2-ply	1889	507
Do	1889	508
0.12 inch diameter, Coy linen gilling, 3-ply	1889	506
Do	1889	509
0.13 inch diameter, Barbour's gilling thread	1889	502
0.13 inch diameter, Barbour's linen shoe thread	1889	503
Do	1889	505
0.13 inch diameter, Marshall's linen thread	1889	512
0.14 inch diameter, No. 4 linen shot lines	1894	627
0.15 inch diameter, Barbour's linen shoe thread	1889	504
0.16 inch diameter, Smith & Dove sail twine	1889	511
0.17 inch diameter, Coy linen gilling, 2-ply	1889	510
0.17 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	535
0.17 inch diameter, Coy linen gilling, 2-ply, tested after wetting and drying	1889	562
0.18 inch diameter, Coy linen gilling, 2-ply	1889	507
0.18 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	534
0.18 inch diameter, Coy linen gilling, 2-ply, tested after wetting and drying	1889	562
0.18 inch diameter, Barbour's linen shoe thread	1889	503
0.18 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	536
0.18 inch diameter, Barbour's linen shoe thread, tested after wetting and drying	1889	563
0.19 inch diameter, Barbour's linen shoe thread	1889	505
0.19 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	537
0.19 inch diameter, Barbour's linen shoe thread, tested wet	1889	557

Subject.	Year.	Page.
Cordage—Continued.		
Linen—Continued.		
3 strands—Continued.		
Elongation tests—Continued.		
0.19 inch diameter, Coy linen gilling, 2-ply	1889	508
0.19 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	534
Do	1889	535
0.19 inch diameter, Coy linen gilling, 3-ply	1889	506
Do	1889	509
0.19 inch diameter, Coy linen gilling, 3-ply, permanent sets during test	1889	534
Do	1889	535
0.19 inch diameter, Coy linen gilling, 3-ply, tested after wetting and drying	1889	563
0.19 inch diameter Marshall's linen thread	1889	512
0.19 inch diameter, Marshall's linen thread, permanent sets during test	1889	538
0.19 inch diameter, Marshall's linen thread, tested wet	1889	556
0.19 inch diameter, No. 7 linen shot lines	1894	632
Do	1894	634
0.20 inch diameter, Barbour's gilling thread	1889	502
0.20 inch diameter, Barbour's gilling thread, permanent sets during test	1889	537
0.20 inch diameter, Barbour's gilling thread, tested after wetting and drying	1889	564
0.20 inch diameter, Barbour's gilling thread, repeated stress, wet during test	1889	572
0.20 inch diameter, Smith & Dove sail twine	1889	511
0.20 inch diameter, Smith & Dove sail twine, permanent sets during test	1889	538
0.20 inch diameter, Smith & Dove sail twine, tested wet	1889	556
0.20 inch diameter, No. 7 linen shot lines	1890	1143
0.20 inch diameter, No. 7 linen shot lines, sample from coil previously tested	1894	624
0.21 inch diameter, Barbour's linen shoe thread	1889	504
0.21 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	536
0.29 inch diameter, No. 9 linen shot lines	1894	621
0.29 inch diameter, No. 9 linen shot lines, under continuous load, wet and dry	1897	543
Tensile tests—		
57-thread, Scotch gilling twine	1886	1752
Do	1887	994
0.07 inch diameter, No. 3 fishing line	1897	565
0.11 inch diameter, Coy linen gilling, 2-ply	1889	495
0.12 inch diameter, Coy linen gilling, 2-ply	1889	495
0.12 inch diameter, Coy linen gilling, 3-ply	1889	495
0.13 inch diameter, Barbour's gilling thread	1889	495
0.13 inch diameter, Barbour's linen shoe thread	1889	495
0.13 inch diameter, Marshall's linen thread	1889	496
0.13 inch diameter, No. 4 linen shot line	1896	479
0.14 inch diameter, No. 0 fishing line	1897	565
0.14 inch diameter, No. 4 linen shot line	1890	1137
Do	1895	707
Do	1897	573
Do	1903	487
0.14 inch diameter, No. 4 linen shot line, coil previously tested	1894	632
0.15 inch diameter, No. 4 linen shot line	1890	1147
Do	1905	227

Subject.	Year.	Page.
Cordage—Continued.		
Linen—Continued.		
3 strands—Continued.		
Tensile tests—Continued.		
No. 5 linen, solid braided, Silver Lake Co	1906	177
0.15 inch diameter, Barbour's linen shoe thread	1889	495
0.16 inch diameter, Smith & Dove sail twine	1889	496
Scotch gilling twine	1886	1752
0.17 inch diameter, Coy linen gilling, 2-ply	1889	495
0.17 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	531
0.17 inch diameter, Coy linen gilling, 2-ply, tested after wetting and drying	1889	561
0.18 inch diameter, Coy linen gilling	1889	495
0.18 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	531
0.18 inch diameter, Coy linen gilling, 2-ply, tested after wetting and drying	1889	561
0.18 inch diameter, Barbour's linen shoe thread	1889	495
0.18 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	531
0.18 inch diameter, Barbour's linen shoe thread, tested after wetting and drying	1889	561
0.19 inch diameter, Barbour's linen shoe thread	1889	495
0.19 inch diameter, Barbour's linen shoe thread, permanent sets during test	1889	531
0.19 inch diameter, Barbour's linen shoe thread, tested wet	1889	549
0.19 inch diameter, Coy linen gilling, 2-ply	1889	495
0.19 inch diameter, Coy linen gilling, 2-ply, permanent sets during test	1889	531
0.19 inch diameter, Coy linen gilling, 3-ply	1889	495
0.19 inch diameter, Coy linen gilling, 3-ply, permanent sets during test	1889	531
0.19 inch diameter, Coy linen gilling, 3-ply, tested after wetting and drying	1889	561
0.19 inch diameter, Marshall's linen thread	1889	496
0.19 inch diameter, Marshall's linen thread, permanent sets during test	1889	531
0.19 inch diameter, Marshall's linen thread, tested wet	1889	549
0.19 inch diameter, No. 7 linen shot lines	1894	634
Do	1894	636
0.20 inch diameter, Cod line	1897	561
0.20 inch diameter, Barbour's gilling thread	1889	494
0.20 inch diameter, Barbour's gilling thread, permanent sets during tests	1889	531
0.20 inch diameter, Barbour's gilling thread, tested after wetting and drying	1889	561
0.20 inch diameter, Smith & Dove sail twine	1889	496
0.20 inch diameter, Smith & Dove sail twine, permanent set during test	1889	531
0.20 inch diameter, Smith & Dove sail twine, permanent set during test, tested wet	1889	549
0.20 inch diameter, No. 7 linen shot lines	1889	590
Do	1890	1141
Do	1896	483
Do	1890	1144
0.20 inch diameter, No. 7 linen shot lines, waterproofed	1890	1143
No. 7 linen shot lines, waterproofed	1908	298

Subject.	Year.	Page.
Cordage—Continued.		
Linen—Continued.		
3 strands—Continued.		
Tensile tests—Continued.		
0.20 inch diameter, No. 7 linen shot lines, coil previously tested	1894	632
0.21 inch diameter, Barbour's linen shoe thread	1889	495
0.21 inch diameter, Barbour's linen shoe thread, permanent sets during tests	1889	531
0.21 inch diameter, No. 7 linen shot lines	1895	708
0.21 inch diameter, No. 7 linen shot lines, after being stored in moist room	1895	709
0.22 inch diameter, No. 7 linen shot lines	1903	486
0.23 inch diameter, No. 7 linen shot lines	1897	572
Do	1900	1145
Do	1905	226
0.27 inch diameter, No. 9 linen shot lines	1896	485
0.28 inch diameter, No. 9 linen shot lines	1890	1146
0.28 inch diameter, No. 9 linen shot lines, coil previously tested	1894	630
0.28 inch diameter, No. 9 linen shot lines, heated before testing	1894	631
0.29 inch diameter, No. 9 linen shot lines	1890	1148
Do	1895	710
Do	1897	571
Do	1903	485
0.31 inch diameter, No. 9 linen shot lines	1900	1143
Do	1905	225
Shot lines, linen, samples for United States Life-Saving Service	1909	1040–42
Manila—		
Descriptive remarks	1884	473
Do	1889	491
Do	1896	459
Do	1897	481
Analysis, chemical	1896	460
Ash, percentage of, in rope	1896	460
Lengths, strands and yarns	1889	580
Do	1896	459
Do	1897	482
Specifications, United States Navy, weights and strengths	1884	473
Strength, plain rope, hitches, knots, and splices	1891	780, 781
Do	1897	483, 537
Do	1897	538
Tests, fibers, strands, and yarns	1884	475
Do	1889	579
Do	1891	773, 774
Do	1897	482, 566
Weights, variations in, due to atmospheric conditions	1897	484
Elongation tests—		
Continuous load, wet and dry conditions—		
$\frac{1}{16}$ inch diameter, cable	1889	573
$1\frac{3}{4}$ inches circumference, 10-pound load	1897	544
$1\frac{3}{4}$ inches circumference, 20-pound load	1897	545
$1\frac{3}{4}$ inches circumference, 40-pound load	1897	545
$1\frac{3}{4}$ inches circumference, 60-pound load	1897	546
2 inches	1897	548
3 inches	1897	549
$3\frac{1}{4}$ inches	1897	547
4 inches	1897	541

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Cordage—Continued.		
Manila—Continued.		
Elongation tests—Continued.		
Free contraction in tank and out of doors—		
1⅛ inches	1897	553
6¼ inches	1897	553
9 inches	1897	554
9½ inches	1897	554
Strap (sling), 206 yarns, lighthouse inspector	1891	777
3 strands—		
Elongation tests—		
0.65 inch diameter, 15 threads	1896	461
0.21 inch diameter	1889	499
0.21 inch diameter, tested wet	1889	560
0.21 inch diameter, repeatedly strained	1889	571
0.26 inch diameter, permanent sets during test	1889	532
0.26 inch diameter, tested wet	1889	560
0.26 inch diameter, tested after wetting and drying	1889	567
1¾ inches circumference	1897	489
1¾ inches circumference, tested wet	1897	490
2 inches circumference	1885	1115
Do	1885	1120
Do	1896	461
2¼ inches circumference, tested wet	1897	491
2½ inches circumference	1885	1115
Do	1885	1120
2¾ inches circumference	1897	493
2¾ inches circumference, tested wet	1897	494
2.88 inches circumference	1891	762
3 inches circumference	1885	1115
Do	1885	1120
Do	1896	462
3 inches circumference, tested wet	1897	504
3 inches circumference, repeatedly strained	1897	528
3 inches circumference, strained and then wetted	1897	532
Do	1897	533
3¼ inches circumference	1884	479
Do	1884	482
Do	1884	484
3½ inches circumference	1884	478
Do	1885	1114
Do	1885	1119
3¾ inches circumference	1884	480
Do	1884	483
3¾ inches circumference, strained and then wetted	1897	531
4 inches circumference	1885	1114
Do	1897	505
Do	1885	1119
4 inches circumference, tested wet	1897	495
Do	1897	506
4 inches circumference, repeatedly strained	1897	525
4½ inches circumference	1885	1110
Do	1885	1116
4.69 inches circumference	1891	763
Do	1891	775
5 inches circumference, tested wet	1897	496
5 inches circumference, repeatedly strained	1897	526
6 inches circumference, tested wet	1897	509
6 inches circumference, strained and then wetted	1897	510
6.50 inches circumference	1891	765
6.50 inches circumference, strained, removed from machine, wetted, and dried	1891	767
6.50 inches circumference, tested wet	1891	772

Subject.	Year.	Page.
Cordage—Continued.		
Manila—Continued.		
3 strands—Continued.		
Elongation tests—Continued.		
7.00 inches circumference, tested wet	1897	497
8.15 inches circumference	1897	498
8.00 inches circumference, tested wet	1897	499
9.45 inches circumference	1893	427
8.78 inches circumference	1897	500
9.00 inches circumference, tested wet	1897	502
10.24 inches circumference	1897	503
11.20 inches circumference	1893	431
13.38 inches circumference	1893	433
Specimens—		
Isthmian Canal	1910	226
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Watertown Arsenal	1910	226
Do	1911	159
Do	1912	195–205
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0.99 inch circumference, 6-thread	1907	105
0.83 inch circumference, 6-thread	1896	475
0.84 inch circumference, 6-thread	1897	555, 567
0.88 inch circumference, 6-thread	1893	435
0.94 inch circumference, 6-thread	1893	435
0.99 inch circumference, 6-thread	1906	175
9-thread	1905	231
Do	1907	105
1.00 inch circumference, 9-thread	1897	555, 567
1.04 inches circumference, 9-thread	1896	475
1.06 inches circumference, 9-thread	1893	435
1.22 inches circumference, 9-thread	1906	175
1.13 inches circumference, 9-thread	1893	435
1.30 inches circumference, 9-thread	1906	175
12-thread	1905	232
Do	1907	105
1.17 inches circumference, 12-thread	1896	475
1.20 inches circumference, 12-thread	1897	555, 567
1.25 inches circumference, 12-thread	1890	1151
Do	1893	435
1.31 inches circumference, 12-thread	1893	435
15-thread	1903	488
Do	1905	232
Do	1905	233
Do	1907	105
1.37 inches circumference, 15-thread	1896	475
1.38 inches circumference, 15-thread	1893	435
1.42 inches circumference, 15-thread	1897	555, 567
1.44 inches circumference, 15-thread	1893	435
1.55 inches circumference, 15-thread	1906	175
1.64 inches circumference, 15-thread	1906	175
18-thread	1903	488
Do	1905	231
Do	1905	232
Do	1905	233
Do	1907	105
1.50 inches circumference, 18-thread	1890	1151
1.56 inches circumference, 18-thread	1893	435
1.63 inches circumference, 18-thread	1893	435
21-thread	1903	488
Do	1905	233
Do	1907	105

Subject.	Year.	Page.
Cordage—Continued.		
Manila—Continued.		
3 strands—Continued.		
Tensile tests—Continued.		
1.63 inches circumference, 21-thread	1890	1151
Do	1893	435
1.75 inches circumference, 21-thread	1893	435
1.80 inches circumference, 21-thread	1906	175
1.81 inches circumference, 21-thread	1893	435
0.21 inch diameter	1889	494
0.21 inch diameter, tested wet	1889	549
0.26 inch diameter	1889	494
0.26 inch diameter, permanent sets during test	1889	531
0.26 inch diameter, tested wet	1889	549
0.26 inch diameter, tested after wetting and drying	1889	561
1.00 inches circumference	1907	105
1.10 inches circumference	1906	175
1.13 inches circumference	1890	1151
1.15 inches circumference	1897	562
1.19 inches circumference	1893	436
1.25 inches circumference	1893	436
1.50 inches circumference	1891	761
Do	1896	475
Do	1904	291
Do	1905	232
Do	1907	105
Do	1906	175
1.58 inches circumference	1897	555, 567
1.62 inches circumference	1894	637
1.65 inches circumference	1896	475
1.75 inches circumference	1890	1151
Do	1893	436
1.81 inches circumference	1893	436
1.85 inches circumference	1897	555, 567
1.86 inches circumference	1897	562
1.90 inches circumference	1897	555, 567
1.93 inches circumference	1897	555, 567
1.94 inches circumference	1896	475
Do	1891	783
2.00 inches circumference	1885	1121
Do	1893	436
2.13 inches circumference	1890	1151
2.21 inches circumference	1897	555, 567
2.31 inches circumference	1893	436
2.37 inches circumference	1896	475
2.38 inches circumference	1891	783
2.43 inches circumference	1897	555, 567
2.50 inches circumference	1885	1121
2.52 inches circumference	1897	562
2.56 inches circumference	1891	783
2.62 inches circumference	1894	637
2.63 inches circumference	1897	555, 567
2.66 inches circumference	1896	475
2.75 inches circumference	1890	1151
Do	1893	436
Do	1897	560, 567
2.81 inches circumference	1891	783
2.88 inches circumference	1893	436
Do	1891	762
2.90 inches circumference	1897	562
2.98 inches circumference	1897	556, 567
3.00 inches circumference	1885	1121
Do	1889	487

Subject.	Year.	Page.
Cordage—Continued.		
Manila—Continued.		
3 strands—Continued.		
Tensile tests—Continued.		
3.00 inches circumference	1891	783
Do	1897	560, 567
Do	1897	562
Do	1903	488
3.12 inches circumference	1889	487
3.13 inches circumference	1897	556, 567
3.20 inches circumference	1897	560, 567
3.21 inches circumference	1896	475
Do	1898	674
3.25 inches circumference	1893	436
Do	1884	474
3.27 inches circumference	1897	562
3.31 inches circumference	1891	783
Do	1893	436
3.38 inches circumference	1893	436
3.44 inches circumference	1897	556, 567
Do	1884	474
Do	1885	1121
3.50 inches circumference	1890	1151
Do	1896	475
Do	1891	783
3.60 inches circumference	1897	556, 567
3.75 inches circumference	1891	782
Do	1884	474
3.81 inches circumference	1893	436
3.88 inches circumference	1891	783
3.95 inches circumference	1897	556, 567
3.96 inches circumference	1897	556, 567
4.00 inches circumference	1885	1121
Do	1890	1151
Do	1893	436
4.06 inches circumference	1893	436
4.08 inches circumference	1897	556, 567
4.22 inches circumference	1897	556, 567
4.25 inches circumference	1891	783
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Do	1897	556, 567
4.35 inches circumference	1897	562
4.38 inches circumference	1893	435
4.44 inches circumference	1893	436
Do	1885	1121
Do	1890	1151
Do	1892	612
Do	1893	436
4.63 inches circumference	1891	782
Do	1891	783
4.69 inches circumference	1891	763
Do	1891	782
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4.75 inches circumference	1897	562
Do	1894	637
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5.88 inches circumference	1890	1151
Do	1893	436
5.90 inches circumference	1897	557, 567
5.94 inches circumference	1891	783
Do	1893	436
6.00 inches circumference	1891	783
Do	1893	436
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6.31 inches circumference	1893	436
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Do	1893	436
6.63 inches circumference	1891	783
Do	1892	612
6.75 inches circumference	1890	1151
Do	1891	783
6.80 inches circumference	1897	557, 567
Do	1897	557, 567
Do	1897	562
6.98 inches circumference	1897	557, 567
7.00 inches circumference	1890	1151
Do	1893	436
7.25 inches circumference	1891	783
Do	1893	436
7.50 inches circumference	1890	1151
7.63 inches circumference	1893	436
7.72 inches circumference	1897	557, 567
7.88 inches circumference	1893	436
8.00 inches circumference	1890	1151
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8.25 inches circumference	1893	436
8.31 inches circumference	1891	783
8.50 inches circumference	1891	783
8.63 inches circumference	1890	1151
8.78 inches circumference	1897	557, 567
8.80 inches circumference	1897	557, 567
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Do	1905	232
2.53 inches circumference	1906	175
2.85 inches circumference	1906	175
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Do	1905	232
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3.52 inches circumference	1906	175
3.62 inches circumference	1896	475
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3.95 inches circumference	1896	475
4.00 inches circumference	1904	291
Do	1905	232
Do	1905	233
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4.30 inches circumference	1906	175
4.50 inches circumference	1905	232
Do	1905	233
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Barrel, cast iron	1899	623
Do	1900	1031, 1047
Firing-valve bushing, bronze	1900	1077
Gatling, barrel, steel	1897	179
Do	1898	185
Do	1900	876
Life-saving, Lyle, bronze	1884	422
Do	1900	1078
Do	1905	127
Woodbridge, tube	1883	193
75 mm. Mountain—		
Block carriers	1902	15
Do	1904	64
Bodies	1902	13
Do	1903	27
Do	1904	63
Breech blocks	1902	14
Do	1903	43
Tabulation	1902	15
Do	1903	43
6-pounder, rapid fire—		
Jackets	1899	16
Tabulation	1899	19
Tubes	1899	13
6-pounder, bronze, old	1884	432
12-pounder, bronze, old	1902	72
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Breech blocks	1903	22
Do	1904	19
Breech bushings	1903	23
Do	1904	20
Jackets	1903	17
Do	1904	16
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Tabulation	1903	23
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Tubes	1903	13
Do	1904	13
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3-inch R. F	1905	73
Breech blocks	1903	52
Do	1904	29
Do	1905	29
Do	1906	69
Breech bushings	1906	74
Carrier blocks	1903	56
Do	1904	65
Clips	1904	65
Do	1905	31
Hoops	1899	39
Jackets	1899	35
Do	1900	17
Do	1903	50
Do	1904	25
Do	1905	19
Do	1906	48

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Locking ring	1903	55
Tabulation	1899	40
Do	1900	21
Do	1903	56
Do	1904	30
Do	1905	33
Do	1906	75
Tubes	1899	23
Do	1900	15
Do	1903	47
Do	1904	23
Do	1905	11
Do	1906	33
3-inch field gun, 1905, breech block, jacket, lock hoop and tube	1910	12–23
3.2-inch steel breech-loading—		
Band	1884	263
Base keys and key rings	1886	481
Do	1887	163
Do	1888	210
Block carriers	1887	173
Breech blocks	1886	427
Do	1887	158
Do	1888	209
Gas checks	1887	177
Do	1888	211
Do	1890	42
Jackets	1884	257
Do	1886	189
Do	1887	57
Do	1888	115
Do	1889	23
Do	1891	15
Do	1892	18
Do	1893	20
Do	1897	21
Do	1898	29
Do	1899	46
Sleeves	1886	495
Do	1887	132
Do	1888	207
Tabulation	1886	513
Do	1887	190
Do	1888	214
Do	1889	34
Do	1890	49
Do	1891	19
Do	1892	22
Do	1893	26
Do	1897	26
Do	1898	45
Do	1899	49
Trunnion hoops	1884	269
Do	1886	317
Do	1887	109
Do	1888	145
Tubes	1886	13
Do	1887	13
Do	1888	7
Do	1889	11
Do	1890	15

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Tubes	1891	9
Do	1892	13
Do	1893	15
Do	1897	15
Do	1898	13
Do	1899	43
3.2-inch B. L. (Driggs-Schroeder), steel tube	1891	20
3.6-inch steel-breech loading—		
Jackets	1889	41
Do	1892	30
Key ring	1890	50
Sleeves	1889	45
Tabulation	1889	47
Do	1892	34
Tubes	1889	37
Do	1892	25
4.7-inch rapid-fire Hotchkiss, specimens from exploded breech	1895	313
4.7-inch siege, model of 1906, tube, jacket and gun body	1910	25–28
5-inch Mann, tube	1884	407
5-inch rapid-fire	1905	74
Breech blocks	1903	65
Gas checks	1903	67
Hoops	1903	63
Jackets	1898	192
Do	1899	73
Do	1903	61
Do	1904	34
Recoil bands	1904	65
Spindles	1903	66
Tabulation	1899	77
Do	1903	67
Tubes	1898	189
Do	1899	497
Do	1903	59
Do	1904	33
5-inch steel breech-loading—		
Base ring	1886	549
Breech blocks	1886	547
Gas-check cups	1888	219
Jackets	1886	533
Do	1887	196
Do	1891	26
Do	1892	44
Do	1893	33
Do	1897	30
Do	1898	56
Do	1899	63
Do	1900	31
Do	1901	19
Obturator stems	1886	553
Sleeves	1886	551
Tabulation	1886	554
Do	1891	28
Do	1892	44
Do	1893	36
Do	1899	70
Do	1900	33
Do	1901	19
Tubes	1886	527

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5-inch steel breech-loading—Continued.		
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Do	1892	43
Do	1893	29
Do	1897	29
Do	1898	55
Do	1899	57
Do	1900	29
Do	1901	17
6-inch rapid-fire	1905	74
Breech blocks	1902	25
Do	1904	52
Do	1905	46
Breech bushing	1906	85
Hoops	1902	24
Do	1905	40
Do	1906	84
Jackets	1899	87
Do	1900	38
Do	1901	27
Do	1902	21
Do	1904	44
Do	1905	38
Do	1906	80
Spindles	1905	50
Do	1906	86
Tabulation	1899	92
Do	1901	30
Do	1902	25
Do	1904	54
Do	1905	50, 59
Do	1906	87
Tubes	1899	81
Do	1900	37
Do	1901	23
Do	1902	19
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Do	1906	79
Model of 1908, parts	1910	29–33
6-inch siege howitzer, 1908	1910	36
6-inch, steel, Navy, jacket	1885	625
6-inch, wire-wound, Crozier, experimental	1907	44, 46
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6½-inch, Mann—		
Breech hoop	1885	631
Retaining ring	1885	634
Side straps	1885	637
Transom	1885	638
7-inch, No. 97, "A" hoop	1910	55–56
8-inch steel breech-loading—		
Block carrier	1887	438
Breech blocks and bushing rings	1885	395
Do	1887	422
Breech plates	1893	264
Do	1896	237
Do	1897	301
Console, bronze	1885	399
Gas-check cups and ring	1887	431
Hoops	1884	389
Do	1885	291, 353

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8-inch steel breech-loading—Continued.		
Hoops	1886	943
Do	1887	299
Do	1888	227
Jackets	1885	273,327, 343
Do	1887	267
Do	1890	57
Do	1891	83
Do	1892	51
Do	1893	63
Do	1894	27
Do	1895	25
Coupling pin	1886	597
Spindle	1887	440
Hinge pin	1887	446
Tabulation	1885	313, 401
Do	1886	598
Do	1887	447
Do	1891	115
Do	1892	56
Do	1893	79
Do	1894	37
Do	1895	35
Trays	1895	197, 206
	1896	237
Trunnion hoops	1885	392
Do	1886	589, 953
Tubes	1884	377
Do	1885	259,317, 337
Do	1886	557
Do	1887	261
Do	1888	221
Do	1891	43
Do	1893	49
Do	1894	17
Do	1895	15
Do	1906	94
8-inch steel breech-loading (Yates), tube	1885	640
8-inch converted—		
Tubes	1885	9
Do	1886	603
Do	1887	207
Tabulation	1886	929
Do	1887	256
10-inch steel breech-loading—		
Bail	1892	344
Breechblocks and bushing ring	1887	586
Do	1902	33
Do	1904	66
Breech plates	1893	264
Do	1896	237
Do	1897	301
Bushing rings and tray casting	1889	372
Gas checks and gas-check ring	1887	593
Do	1903	74
Hinge lug plates	1899	695–698
Hinge pin	1887	608
Hoops	1886	1023
Do	1887	495

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Hoops	1888	233
Do	1889	55
Do	1902	32
Do	1903	73
Jackets	1886	993
Do	1887	475
Do	1892	74
Do	1893	87
Do	1894	65
Do	1895	45
Do	1896	28
Do	1897	55
Do	1898	65
Do	1899	103
Do	1900	61
Do	1901	40
Do	1902	30
Do	1903	72
Securing pin	1887	606
Spindles and faceplate	1887	598, 600
Do	1903	74
Trays	1895	197, 206
	1896	237
Trunnion hoops	1886	1017
Tubes	1886	973
Do	1887	455
Do	1892	59
Do	1893	83
Do	1894	41
Do	1895	39
Do	1896	13
Do	1897	45
Do	1898	63
Do	1900	59
Do	1901	39
Do	1902	29
Do	1903	71
Tabulation	1886	1078
Do	1887	609
Do	1889	377
Do	1892	89
Do	1893	94
Do	1894	87
Do	1895	57
Do	1896	38
Do	1897	64
Do	1898	67
Do	1900	62
Do	1901	41
Do	1902	33
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Bodies	1884	415
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Hoops	1890	91
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Sleeve	1885	427
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Do	1891	168
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Do	1891	134
Tubes	1885	404
Do	1886	1083
Do	1890	63
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Jacket	1892	93
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Breechblocks and bushing	1890	166
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Breech plate	1893	264
Do	1896	237
Do	1897	301
Gas checks	1890	164
Do	1901	65
Hoops	1889	61
Do	1890	147
Do	1902	42
Jackets	1890	130
Do	1892	110
Do	1893	101
Do	1894	101
Do	1895	73
Do	1896	45
Do	1897	72
Do	1898	75
Do	1899	112
Do	1900	66
Do	1901	48
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Do	1894	104
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Do	1896	49
Do	1897	75
Do	1898	77
Do	1899	114
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Do	1902	43
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Bodies	1885	475
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710° F	1888	500
716° F	1888	500
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963° F	1888	501
986° F	1888	501
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Do	1896	226
Do	1897	282
Do	1898	369
Do	1899	644
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Nittany	1900	1042
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Rebecca	1896	226
Do	1897	282
Do	1899	644
Salisbury	1895	181
Do	1896	226
Do	1897	282
Do	1898	369
Do	1899	644
Do	1900	1042
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Shelby	1898	369
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Iron plates—		
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⅜-inch plates, ¾-inch iron rivets, 1 1/16-inch drilled holes	1882	177
Lap joints, single riveted—		
¼-inch plates, ⅝-inch iron rivets, 1 1/16-inch drilled holes	1882	175
⅜-inch plates, 1 1/16-inch iron rivets, ¾-inch drilled holes	1882	173
Steel plates—		
Lap joints, single riveted—		
¼-inch plates, ⅝-inch iron rivets, 1 1/16-inch drilled holes	1882	176
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¼-inch plates—		
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1⅝-inch pitch	1882	19
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1¾-inch pitch	1882	36
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1 1/16-inch iron rivets, ¾-inch punched holes, 2-inch pitch	1882	44
Tabulation	1882	133
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Butt joints, single riveted—		
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1⅝-inch pitch	1885	809
1¾-inch pitch	1885	813
1⅞-inch pitch	1885	815
1 1/16-inch iron rivets, ¾-inch drilled holes—		
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1⅞-inch pitch	1885	819

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Butt joints, single riveted—Continued.		
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2-inch pitch	1885	821
2⅛-inch pitch	1885	823
2¼-inch pitch	1885	826
11/16-inch iron rivets, ⅞-inch drilled holes—		
1⅞-inch pitch	1885	829
2-inch pitch	1885	832
2⅛-inch pitch	1885	834
2¼-inch pitch	1885	836
2⅜-inch pitch	1885	839
2½-inch pitch	1885	841
2⅝-inch pitch	1885	844
2¾-inch pitch	1891	448
2⅞-inch pitch	1891	450
3-inch pitch	1891	456
11/16-inch iron rivets, 1-inch drilled holes—		
2-inch pitch	1885	847
2⅛-inch pitch	1885	850
2¼-inch pitch	1885	852
2⅜-inch pitch	1885	854
2½-inch pitch	1885	856
2⅝-inch pitch	1885	859
2¾-inch pitch	1885	862
2⅞-inch pitch	1885	865
3-inch pitch	1885	868
Tabulation	1885	922
Do	1891	560, 562
5/16-inch plates—		
7/16-inch iron rivets, ½-inch drilled holes—		
1-inch pitch	1891	486
1¼-inch pitch	1891	487
1½-inch pitch	1891	488
11/16-inch iron rivets, 1-inch drilled holes, 3½-inch pitch	1891	492
Tabulation	1891	568, 570
⅜-inch plates—		
9/16-inch iron rivets, ⅝-inch drilled holes—		
1⅝-inch pitch	1885	871
1¾-inch-pitch	1885	874
11/16-inch iron rivets, ¾-inch drilled holes—		
1¾-inch pitch	1885	876
1⅞-inch pitch	1885	878
2-inch pitch	1885	881
2⅛-inch pitch	1885	883
11/16-inch iron rivets, ⅞-inch drilled holes—		
1⅞-inch pitch	1885	885
2-inch pitch	1885	887
2⅛-inch pitch	1885	889
2¼-inch pitch	1885	891
2⅜-inch pitch	1885	893
2½-inch pitch	1885	895
11/16-inch iron rivets, 1-inch drilled holes—		
2-inch pitch	1885	899
2⅛-inch pitch	1885	901
2¼-inch pitch	1885	903
2⅜-inch pitch	1885	906
2½-inch pitch	1885	908

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Steel plates—Continued.		
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2⅝-inch pitch	1885	910
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2⅞-inch pitch	1885	915
Tabulation	1885	928
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⅝-inch iron rivets, ⅞-inch drilled holes—		
2-inch pitch	1891	529
2¼-inch pitch	1891	531
2½-inch pitch	1891	533
2¾-inch pitch	1891	535
⅝-inch iron rivets, ⅞-inch punched holes—		
2-inch pitch	1891	530
2¼-inch pitch	1891	532
2½-inch pitch	1891	534
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Butt joints, single riveted, tested hot and cold—		
½-inch plates—		
⅝-inch iron rivets, ¾-inch drilled holes—		
1¾-inch pitch	1886	1271
1⅞-inch pitch	1886	1275
2-inch pitch	1886	1277
1¾-inch pitch, 200° F	1886	1269
1⅞-inch pitch, 300° F	1886	1273
2-inch pitch, 350° F	1886	1279
⅝-inch iron rivets, ⅞-inch drilled holes—		
1⅞-inch pitch	1886	1281
2-inch pitch	1886	1285
2⅛-inch pitch	1886	1291
2¼-inch pitch	1886	1293
2⅜-inch pitch	1886	1299
1⅞-inch pitch, 250° F	1886	1283
2-inch pitch, 300° F	1886	1287
2⅛-inch pitch, 400° F	1886	1289
2¼-inch pitch, 500° F	1886	1295
2⅜-inch pitch, 350° F	1886	1297
⅝-inch iron rivets, 1-inch drilled holes—		
2-inch pitch	1886	1303
2⅛-inch pitch	1886	1305
2¼-inch pitch	1886	1311
2⅜-inch pitch	1886	1315
2½-inch pitch	1886	1319
2⅝-inch pitch	1886	1321
2¾-inch pitch	1886	1327
2-inch pitch, 250° F	1886	1301
2⅛-inch pitch, 300° F	1886	1307
2¼-inch pitch, 200° F	1886	1309
2⅜-inch pitch, strained hot, then ruptured cold	1886	1313
2½-inch pitch, strained hot, then ruptured cold	1886	1317
2⅝-inch pitch, 400° F	1886	1323
2¾-inch pitch, 500° F	1886	1325
⅝-inch steel rivets, 1-inch punched holes, 2-inch pitch	1883	39

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Tensile tests—Continued.		
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1 1/16-inch iron rivets, 1⅛-inch drilled holes—		
2⅛-inch pitch	1886	1331
2¼-inch pitch	1886	1335
2⅜-inch pitch	1886	1339
2½-inch pitch	1886	1341
2⅝-inch pitch	1886	1345
2¾-inch pitch	1886	1351
2⅞-inch pitch	1886	1355
3-inch pitch	1886	1359
3⅛-inch pitch	1886	1361
2⅛-inch pitch, 300° F	1886	1329
2¼-inch pitch, 350° F	1886	1333
2⅜-inch pitch, 700° F	1886	1337
2½-inch pitch, 500° F	1886	1343
2⅝-inch pitch, 600° F	1886	1349
2⅞-inch pitch, 500° F	1886	1353
3-inch pitch, 200° F	1886	1357
Tabulation	1883	50
Do	1886	1526
⅝ inch plates—		
1 1/16 inch iron rivets, ⅞-inch drilled holes—		
1⅞-inch pitch	1886	1365
2-inch pitch	1886	1369
2⅛-inch pitch	1886	1375
2⅛-inch pitch, 300° F	1886	1373
2¼-inch pitch, 400° F	1886	1377
2½-inch pitch, 600° F	1886	1379
Tabulation	1883	52
Do	1886	1536
1 1/16-inch iron rivets, 1-inch drilled holes—		
2-inch pitch	1886	1381
2⅛-inch pitch	1886	1385
2¼-inch pitch	1886	1389
2⅜-inch pitch	1886	1393
2½-inch pitch	1886	1397
2⅝-inch pitch	1886	1401
1-inch steel rivets, 1 1/16-inch punched holes, 2⅜-inch pitch	1883	41
1 1/16-inch iron rivets, 1⅛-inch drilled holes—		
2⅛-inch pitch	1886	1405
2¼-inch pitch	1886	1409
2⅜-inch pitch	1886	1413
2½-inch pitch	1886	1417
5⅝-inch pitch	1886	1421
2¾-inch pitch	1886	1425
2⅞-inch pitch	1886	1429
3-inch pitch	1886	1433
3⅛-inch pitch	1886	1437
Tabulation	1883	52
Do	1886	1536
¾-inch plates—		
1 1/16-inch iron rivets, 1-inch drilled holes—		
2-inch pitch	1886	1441
2⅛-inch pitch	1886	1445
2¼-inch pitch	1886	1449
2⅜-inch pitch	1886	1455

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Riveted—Continued.		
Tensile tests—Continued.		
Steel plates—Continued.		
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¾-inch plates—Continued.		
1 5/16-inch steel rivets, 1-inch drilled holes—		
2¼-inch pitch	1886	1451
2⅜-inch pitch	1886	1453
1 5/16-inch iron rivets, 1⅛-inch drilled holes—		
2⅛-inch pitch	1886	1457
2¼-inch pitch	1886	1461
2⅜-inch pitch	1886	1465
2½-inch pitch	1886	1469
2⅝-inch pitch	1886	1473
2¾-inch pitch	1886	1479
1 5/16-inch steel rivets, 1⅛-inch drilled holes—		
2¾-inch pitch	1886	1477
2⅞-inch pitch	1886	1481
1⅛-inch steel rivets, 1 5/16-inch punched holes, 2½-inch pitch	1883	43
1 5/16-inch iron rivets, 1¼-inch drilled holes—		
2¼-inch pitch	1886	1485
2⅜-inch pitch	1886	1489
2½-inch pitch	1886	1493
2⅝-inch pitch	1886	1497
2¾-inch pitch	1886	1501
2⅞-inch pitch	1886	1505
3-inch pitch	1886	1509
3⅛-inch pitch	1886	1513
3¼-inch pitch	1886	1519
1 5/16-inch steel rivets, 1¼-inch drilled holes—		
3⅛-inch pitch	1886	1515
3¼-inch pitch	1886	1517
3⅜-inch pitch	1886	1521
Tabulation	1883	52
Do	1886	1544
Butt joints, single and double riveted, ⅜-inch plates, 1 1/16-inch iron rivets, ¾-inch punched holes, 2-inch pitch	1883	37
Tabulation	1883	50
Butt joints, double riveted—		
¼-inch plates—		
9/16-inch iron rivets, ⅝-inch drilled holes, 2⅝-inch pitch	1891	446
1 1/16-inch iron rivets, ⅞-inch drilled holes—		
2⅞-inch pitch	1891	452
3⅛-inch pitch	1891	458
3⅜-inch pitch	1891	462
4⅜-inch pitch	1891	464
Tabulation	1891	560, 562
5/16-inch plates—		
7/16-inch iron rivets, ½-inch drilled holes—		
1¾-inch pitch	1891	489
2-inch pitch	1891	490
2¼-inch pitch	1891	491
1 1/16-inch iron rivets, 1-inch drilled holes, 3½-inch pitch	1891	495
Tabulation	1891	568, 570
⅜-inch plates—		
1 1/16-inch iron rivets, ¾-inch drilled holes—		
2½-inch pitch	1891	506
2⅝-inch pitch	1891	508

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Riveted—Continued.		
Tensile tests—Continued.		
Steel plates—Continued.		
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$\frac{3}{8}$-inch plates—Continued.		
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$3\frac{1}{8}$-inch pitch	1891	510
$3\frac{5}{8}$-inch pitch	1891	516
$4\frac{1}{8}$-inch pitch	1891	511
$1\frac{1}{16}$-inch iron rivets, 1-inch drilled holes—		
$2\frac{7}{8}$-inch pitch	1891	513
$3\frac{3}{8}$-inch pitch	1891	514
$3\frac{7}{8}$-inch pitch	1891	518
$4\frac{3}{8}$-inch pitch	1891	519
$4\frac{7}{8}$-inch pitch	1891	520
$5\frac{3}{8}$-inch pitch	1891	521
Tabulation	1891	b74, 576
$\frac{7}{16}$-inch plates—		
$1\frac{1}{16}$-inch iron rivets, $\frac{3}{4}$-inch drilled holes, $3\frac{1}{8}$-inch pitch	1891	528
$1\frac{1}{16}$-inch iron rivets, 1-inch drilled holes, $2\frac{7}{8}$-inch pitch	1891	536
Tabulation	1891	580, 582
$\frac{1}{2}$-inch plates, $\frac{7}{8}$-inch steel rivets, $1\frac{1}{16}$-inch drilled holes, $3\frac{3}{8}$-inch pitch	1896	252
Tabulation	1896	266
$\frac{5}{8}$-inch plates, $\frac{3}{4}$-inch steel rivets, $\frac{13}{16}$-inch drilled holes, 3-inch pitch	1887	892
Tabulation	1887	916
$\frac{3}{4}$-inch plates—		
$\frac{3}{4}$-inch iron rivets, $1\frac{1}{16}$-inch punched holes	1896	291
$\frac{3}{4}$-inch steel rivets, $1\frac{1}{16}$-inch punched holes	1896	290
$\frac{7}{8}$-inch plates, 1-inch steel rivets, $1\frac{1}{16}$-inch drilled holes, $3\frac{3}{4}$-inch pitch	1887	898
Tabulation	1887	916
Butt joints, triple riveted—		
$\frac{1}{2}$-inch plates, $\frac{5}{8}$-inch iron rivets, $1\frac{1}{16}$-inch punched holes, $3\frac{1}{2}$-inch pitch	1896	336
$\frac{1}{2}$-inch plates—		
$\frac{5}{8}$-inch iron rivets, $1\frac{1}{16}$-inch punched holes, $3\frac{1}{2}$-inch pitch	1896	334
$\frac{7}{8}$-inch iron rivets, $1\frac{5}{16}$-inch drilled holes, $3\frac{1}{4}$-inch pitch	1895	284
$\frac{7}{8}$-inch iron rivets, $1\frac{5}{16}$-inch punched holes, $3\frac{1}{4}$-inch pitch	1895	288
$\frac{7}{8}$-inch steel rivets, $1\frac{5}{16}$-inch drilled holes—		
$2\frac{1}{2}$-inch pitch	1896	253, 255, 258
$3\frac{3}{8}$-inch pitch	1896	254, 256, 257
$\frac{7}{8}$-inch steel rivets, punched and drilled holes—		
$3\frac{1}{4}$-inch pitch	1895	287
$3\frac{1}{2}$-inch pitch	1895	285
Tabulation	1896	267
$\frac{5}{8}$-inch plates—		
$\frac{3}{4}$-inch iron rivets, $\frac{13}{16}$-inch drilled holes, $3\frac{9}{16}$-inch pitch	1887	913
$\frac{3}{4}$-inch steel rivets, $\frac{13}{16}$-inch drilled holes, $3\frac{9}{16}$-inch pitch	1887	895
Tabulation	1887	920, 916

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Riveted—Continued.		
Tensile tests—Continued.		
Steel plates—Continued.		
Butt joints, triple riveted—Continued.		
¾-inch plates—		
¾-inch iron rivets, 1 1/16-inch punched holes	1896	295
¾-inch steel rivets, 1 1/16-inch punched holes	1896	294
⅞-inch plates, 1-inch steel rivets, 1 1/16-inch drilled holes, 4 9/16-inch pitch	1887	901
Tabulation	1887	916
Butt joints, multiple riveted—		
½-inch plates, ⅞-inch steel rivets, 1 1/16-inch drilled holes—		
2½-inch pitch	1896	259, 261
2½-inch pitch, tested hot	1896	260
3⅜-inch pitch	1896	262
Tabulation	1896	271
9/16-inch plates, 1 1/16-inch iron rivets, 1-inch drilled holes, 2⅞-inch pitch	1887	910
Tabulation	1887	920
⅝-inch plates, 1-inch and 1⅛-inch iron rivets, 1 1/16-inch and 1¼-inch drilled holes, 2⅞-inch pitch	1887	907
Tabulation	1887	918
¾-inch plates—		
⅝-inch iron rivets, 1 1/16-inch punched holes—		
3½-inch pitch	1896	325, 331
7-inch pitch	1896	322
¾-inch iron rivets, 1 1/16-inch punched holes	1896	299
¾-inch steel rivets, 1 1/16-inch punched holes	1896	298
⅞-inch plates, 1 1/16-inch and 1⅛-inch iron rivets, 1⅛-inch and 1¼-inch drilled holes, 2⅝-inch pitch	1887	904
Tabulation	1887	918
Butt joints, triple riveted, comparison between single and double plates	1912	128–129
Lap joints, single riveted—		
¼-inch plate—		
⅝-inch iron rivets, 1 1/16-inch drilled holes, 2-inch pitch	1882	72
1 1/16-inch iron rivets, ⅞-inch drilled holes, 2½-inch pitch	1891	468
1 1/16-inch iron rivets, 1-inch drilled holes, 2⅞-inch pitch	1891	474
1 1/16-inch iron rivets, 1⅛-inch drilled holes, 2⅞-inch pitch	1891	476
1 5/16-inch iron rivets, 1¼-inch drilled holes—		
2⅞-inch pitch	1891	478
3⅛-inch pitch	1891	480
3⅜-inch pitch	1891	482
3⅝-inch pitch	1891	484
⅝-inch iron rivets, 1 1/16-inch punched holes, 2-inch pitch	1882	67
7/16-inch steel rivets, ½-inch drilled holes, 1 5/16-inch pitch	1882	80
⅝-inch steel rivets, 1 1/16-inch drilled holes—		
1⅝-inch pitch	1882	78
2-inch pitch	1882	74
⅝-inch steel rivets, 1 1/16-inch punched holes, 2-inch pitch	1882	69
Tabulation	1882	127
Do	1891	564, 566

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Joints—Continued.		
Riveted—Continued.		
Tensile tests—Continued.		
Steel plates—Continued.		
Lap joints, single riveted—Continued.		
⅜-inch plates—		
11/16-inch iron rivets, ¾-inch drilled holes, 1½-inch pitch	1891	522
⅞-inch iron rivets, 15/16-inch drilled holes, 2-inch pitch (reenforced)	1882	102
15/16-inch iron rivets, 1-inch drilled holes, 2⅜-inch pitch	1891	525
11/16-inch iron rivets, ¾-inch punched holes, 2-inch pitch	1882	89
¾-inch iron rivets, 15/16-inch punched holes, 1½-inch pitch	1883	31
1-inch iron rivets, 1 1/16-inch punched holes, 2 5/16-inch pitch	1882	97
¾-inch iron rivets, 15/16-inch reamed holes	1895	286
11/16-inch steel rivets, ¾-inch drilled holes, 1½-inch pitch	1882	93
11/16-inch steel rivets, ¾-inch punched holes, 2-inch pitch	1882	91
¾-inch steel rivets, 15/16-inch punched holes, 2-inch pitch	1882	95
⅞-inch steel rivets, 15/16-inch drilled holes, 2-inch pitch (reenforced)	1882	99
¾-steel rivets, 15/16-inch reamed holes	1895	285
Tabulation	1882	132, 135
Do	1883	48
Do	1891	578
7/16-inch plates—		
11/16-inch iron rivets, ⅞-inch drilled holes—		
1½-inch pitch	1891	537
1⅝-inch pitch	1891	539
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0.44 inch diameter	1896	455
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0.48 inch diameter	1896	455
0.49 inch diameter	1896	455
0.53 inch diameter	1912	206
0.57 inch diameter	1897	577
Do	1912	206
0.61 inch diameter	1912	206
0.66 inch diameter	1896	455
0.68 inch diameter	1896	455
0.71 inch diameter	1897	578
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0.82 inch diameter	1912	206
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0.90 inch diameter	1896	455
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1¾ inches circumference	1889	486
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3 inches circumference	1889	486
Do	1891	786
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3½ inches circumference	1889	486
Do	1891	786
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0.48 inch diameter	1896	441
0.49 inch diameter	1896	441
0.66 inch diameter	1896	442
0.68 inch diameter	1896	443
0.91 inch diameter	1896	445
0.90 inch diameter	1896	447
Do	1896	446
0.96 inch diameter	1896	449
Do	1896	438
0.98 inch diameter	1896	451
1.46 inches diameter	1896	453
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0.42 C	1895	587
0.46 C	1895	588
0.66 C	1895	590
0.26 C (3.282 Ni)	1895	578
0.25 C (4.514 Ni)	1895	580
0.29 C (5.661 Ni)	1895	582
0.539 C (27.353 Ni)	1895	584
Bethlehem, oil hardened and annealed, under maximum fiber stress of 40,000 pounds per square inch—		
0.24 C	1895	586
0.42 C	1895	587
0.46 C	1895	589
0.66 C	1895	591
0.26 C (3.282 Ni)	1895	579
0.25 C (4.514 Ni)	1895	581
0.29 C (5.661 Ni)	1895	583
0.539 C (27.353 Ni)	1895	585
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Bethlehem, annealed at low heat, under maximum fiber stress per square inch of—		
40,000 pounds (0.26 C)	1899	855
40,000–45,000 pounds (0.25 C, 4.60 Ni)	1902	266
45,000 pounds (0.26 C, 3.31 Ni)	1902	272
45,000–50,000 pounds (0.25 C, 4.60 Ni)	1903	315
50,000–60,000 pounds (0.29 C)	1903	335
Bethlehem, annealed at high heat, under maximum fiber stress per square inch of—		
45,000 pounds (0.26 C, 3.31 Ni)	1902	268, 272

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Loaded on double bearing—Continued.		
Repeated stresses—Continued.		
Steel—Continued.		
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45,000 pounds (0.25 C, 4.60 Ni)	1902	274
50,000 pounds (0.25 C, 4.60 Ni)	1903	320
Bethlehem, hardened, under maximum fiber stress per square inch of—		
40,000 pounds (0.26 C)	1900	1134
45,000–50,000 pounds (0.26 C, 3.31 Ni)	1903	314
45,000–55,000 pounds (0.25 C, 4.60 Ni)	1903	313
50,000 pounds (0.25 C, 4.60 Ni)	1903	320
Tabulations	1900	1135
Do	1902	275
Do	1903	346
Bethlehem, oil tempered and annealed at low heat, under maximum fiber stress per square inch of—		
45,000 pounds (0.25 C, 4.60 Ni)	1902	271
45,000 pounds (0.26 C, 3.31 Ni)	1902	273
45,000–50,000 pounds (0.25 C, 4.60 Ni)	1903	316
Bethlehem, oil tempered and annealed at high heat, under maximum fiber stress per square inch of—		
40,000 pounds (0.26 C)	1899	855
40,000 pounds (0.26 C)	1900	1133
45,000 pounds (0.26 C, 3.31 Ni)	1902	273
50,000–55,000 pounds (0.25 C, 4.60 Ni)	1903	318
50,000–60,000 pounds (0.25 C, 4.60 Ni)	1903	319
Bethlehem, treated, under maximum fiber stress per square inch of 40,000–55,000 pounds (0.32 C, 1.20 Mn)	1902	260
Tabulations	1900	1135
Do	1902	275
Do	1903	346
Carbon steel ingot, 0.20 C, under maximum fiber stress per square inch of—		
20,000 pounds (natural state)	1902	268
20,000–35,000 pounds (heated low cherry and quenched in oil)	1903	321
40,000 pounds (heated white hot and quenched in brine)	1903	326
40,000 pounds (heated bright yellow and quenched in oil)	1903	328
40,000 pounds (heated bright yellow, quenched in oil, and annealed)	1903	328
40,000 pounds (heated bright yellow and cooled in sand)	1903	329
40,000 pounds (heated bright red and quenched in oil)	1903	331
20,000–30,000 pounds (oil tempered and annealed)	1902	270
Tabulations	1902	275
Do	1903	346
Cold drawn, under maximum fiber stress of 40,000 pounds per square inch—		
Annealed	1893	466
Untreated	1893	464
Tabulation	1893	487
Cold rolled, under maximum fiber stress of 40,000 pounds per square inch—		
Annealed	1893	459

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Steel—Continued.		
Cold rolled, under maximum fiber stress of 40,000 pounds per square inch—Continued.		
Untreated	1893	458
Tabulation	1893	487
Gautier, run at maximum fiber stress of 60,000 pounds per square inch—		
At temperatures of from 330° to 472° F.—		
0.15 C	1893	474
0.17 C	1893	475
0.34 C	1893	477
0.55 C	1893	479
0.73 C	1893	480
0.82 C	1893	483
1.09 C	1893	485
Tabulation	1893	488
Cooled with water—		
0.15 C	1893	475
0.17 C	1893	476
0.34 C	1893	478
0.55 C	1893	479
0.73 C	1893	482
0.82 C	1893	484
1.09 C	1893	486
Tabulation	1893	488
0.16 C, under maximum fiber stress per square inch of—		
35,000 pounds	1894	507
40,000 pounds	1894	508
45,000 pounds	1894	512
50,000 pounds	1894	516
52,460 pounds	1894	518
55,000 pounds	1894	519
0.17 C, under maximum fiber stress per square inch of—		
35,000 pounds	1894	520
40,000 pounds	1894	521
45,000 pounds	1894	523
50,000 pounds	1894	526
52,460 pounds	1894	528
55,000 pounds	1894	529
0.34 C, under maximum fiber stress per square inch of—		
35,000 pounds	1894	530
40,000 pounds	1894	531
45,000 pounds	1894	533
50,000 pounds	1894	537
52,460 pounds	1894	539
55,000 pounds	1894	540
0.55 C, under maximum fiber stress per square inch of—		
35,000 pounds	1894	541
40,000 pounds	1894	542
45,000 pounds	1894	544
50,000 pounds	1894	547
52,460 pounds	1894	549
55,000 pounds	1894	550
0.73 C, under maximum fiber stress per square inch of—		
35,000 pounds	1894	551
40,000 pounds	1894	552

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Shafts, rotating—Continued.		
Loaded on double bearing—Continued.		
Repeated stresses—Continued.		
Steel—Continued.		
Gautier run at maximum fiber stress of 60,000 pounds per square inch—Continued.		
0.73 C, under maximum fiber stress per square inch of—Continued.		
45,000 pounds	1894	554
50,000 pounds	1894	556
52,460 pounds	1894	559
55,000 pounds	1894	560
0.82 C, under maximum fiber stress per square inch of—		
40,000 pounds	1894	561
45,000 pounds	1894	563
50,000 pounds	1894	565
52,460 pounds	1894	567
55,000 pounds	1894	568
1.09 C, under maximum fiber stress per square inch of—		
40,000 pounds	1894	569
45,000 pounds	1894	571
50,000 pounds	1894	573
52,460 pounds	1894	575
55,000 pounds	1894	576
Tabulations	1894	506, 577
Under maximum fiber stress per square inch of—		
30,000 pounds (0.73 C)	1895	592
30,000 pounds (0.82 C)	1895	593
35,000 pounds (0.82 C)	1895	594
30,000 pounds (1.09 C)	1895	595
35,000 pounds (1.09 C)	1895	594
Tabulation	1895	596
Under maximum fiber stress per square inch of—		
40,000 pounds (0.16 C)	1899	855
40,000 pounds (0.17 C)	1899	855
40,000 pounds (0.34 C)	1899	855
40,000 pounds (0.55 C)	1901	633
40,000–50,000 pounds (0.73 C)	1899	855
Do	1900	1135
Do	1902	263
30,000–45,000 pounds (0.82 C)	1902	259
40,000 and 45,000 pounds (0.82 C)	1899	855
Do	1900	1135
Do	1902	264
40,000 and 45,000 pounds (1.09 C)	1899	855
Do	1900	1135
Do	1902	261
Tabulation	1902	275
0.17 C, under maximum fiber stress per square inch of—		
30,000 and 35,000 pounds	1903	341
Do	1904	299
Do	1905	245
35,000 pounds	1903	341
40,000 pounds	1903	340
45,000 pounds	1903	340
50,000 pounds	1903	339
60,000 pounds	1903	339
0.34 C, under maximum fiber stress per square inch of—		
45,000 pounds	1905	252
50,000 pounds	1905	250
60,000 pounds	1905	249

Subject.	Year.	Page.
Shafts, rotating—Continued.		
Loaded on double bearing—Continued.		
Repeated stresses—Continued.		
Steel—Continued.		
Gautier run at mamimum fiber stress of 60,000 pounds per square inch—Continued.		
0.55 C, under maximum fiber stress per square inch of—		
30,000 and 60,000 pounds	1903	345
Do	1904	299
Do	1905	246
35,000 pounds	1903	344
40,000 pounds	1903	343
45,000 pounds	1903	343
50,000 pounds	1903	342
60,000 pounds	1903	342
0.73 C, under maximum fiber stress per square inch of—		
45,000 pounds	1905	253
50,000 pounds	1905	251
60,000 pounds	1905	250
0.82 C, under maximum fiber stress per square inch of—		
35,000–55,000 pounds	1904	300
Do	1905	247
40,000 pounds	1904	301
Do	1905	249
45,000 pounds	1904	301
50,000 pounds	1904	300
55,000 pounds	1903	345
60,000 pounds	1903	344
1.09 C, under maximum fiber stress per square inch of—		
35,000 pounds	1905	261
40,000 pounds	1905	260
45,000 pounds	1905	260
50,000 pounds	1905	252
60,000 pounds	1905	251
Tabulations	1903	348
Do	1904	302
Do	1905	262
0.17 C, under maximum fiber stress of 40,000 pounds per square inch—		
Annealed	1905	255
Heated to first red and quenched in oil	1905	256
Heated to low yellow and quenched in oil	1905	257
Heated to low yellow and quenched in water	1905	258
Heated to low yellow, quenched in water, and annealed	1905	259
Tabulation	1905	262
Nickel-steel ingot (0.17 C, 3.25 Ni), under maximum fiber stress per square inch of—		
10,000–30,000 pounds (natural state)	1902	267
Do	1903	317
40,000 pounds (heated low cherry and quenched in oil)	1903	332
40,000 pounds (heated white hot and quenched in brine)	1903	329
40,000 pounds (heated bright yellow and quenched in oil)	1903	330

Subject.	Year.	Page.
Shafts, rotating—Continued.		
Loaded on double bearing—Continued.		
Repeated stresses—Continued.		
Steel—Continued.		
Nickel-steel ingot (0.17 C, 3.25 Ni), under maximum fiber stress per square inch of—Continued.		
40,000 pounds (heated bright yellow, quenched in oil, and annealed)	1903	330
40,000 pounds (heated bright yellow and cooled in sand)	1903	331
10,000–30,000 pounds (oil tempered and annealed)	1902	269
Tabulation	1902	275
Do	1903	346
Steel, "rail"—		
Under maximum fiber stress of 40,000–50,000 pounds per square inch, Barrow	1903	324
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Under maximum fiber stress of 40,000 pounds per square inch—		
Cammell, 1872, toughened	1903	323
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Landore Siemens 11.73	1903	326
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38 P. S. Co. 85	1903	332
Sheffield Atlas	1903	325
Wilson Cammell Dowlais	1903	327
Tabulation	1903	347
Do	1905	262
Loaded on single bearing—		
Repeated stresses—		
Description of tests	1888	781
Do	1889	621
Do	1890	865
Do	1892	523
Do	1893	439
Do	1894	503
Do	1895	577
Iron, cast, under maximum fiber stress per square inch of—		
10,000 pounds	1889	356
15,000 pounds	1889	642
Do	1890	1048
Do	1891	671
Do	1892	547
20,000 pounds	1889	641
25,000 pounds	1889	641
Tabulation	1889	647
Do	1890	1054
Do	1891	678
Do	1892	548
Iron, wrought—		
Burden's, under maximum fiber stress per square inch of—		
25,000–47,000 pounds, bar 1	1890	959
40,000 pounds, bar 1	1890	965
40,000 pounds, bar 1 (heated, 423° to 425° F. eight times)	1890	968

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Shafts, rotating—Continued.		
Loaded on single bearing—Continued.		
Repeated stresses—Continued.		
Iron, wrought—Continued.		
Burden's, under maximum fiber stress per square inch of—Continued.		
40,000 pounds, bar 1 (heated, 415° to 425° F. five times)	1890	975
40,000 pounds, bar 2	1890	980
40,000 pounds, bar 2 (heated to 425° F. eight times)	1890	985
40,000 pounds, bar 2 (heated to 425° F. twice)	1890	988
40,000 pounds, bar 2 (heated to 425° F. once)	1890	989
20,000–45,000 pounds, bar 3	1890	991
40,000 pounds, bar 3	1890	997
40,000 pounds, bar 3 (heated to 599° F. once)	1890	1000
40,000 pounds, bar 3 (heated to 598° F. once)	1890	1002
40,000 pounds, bar 4	1890	1004
35,000 pounds, bar 4 (heated to 500° F. six times)	1890	1006
35,000 pounds, bar 4 (heated to 500° F. four times)	1890	1018
30,000 pounds, bar 5	1890	1029
30,000 pounds, bar 5 (heated to 500° F. once)	1890	1030
30,000 pounds, bar 5 (kept cool)	1890	1034
40,000 pounds, bar 6 (kept cool)	1890	1035
40,000 pounds, bar 6 (kept at 200° F.)	1890	1038
40,000 pounds, bar 6 (kept at 210° F.)	1890	1039
40,000 pounds, bar 6 (kept cool)	1890	1040
Cold rolled, under maximum fiber stress per square inch of—		
20,000–45,000 pounds	1891	672
30,000 pounds	1892	537
40,000 pounds	1892	534, 540
45,000 pounds	1891	673
Do	1892	541
50,000 pounds	1892	539, 544
Double refined, under maximum fiber stress per square inch of—		
20,000–32,000 pounds (annealed)	1888	845
20,000–42,000 pounds (unannealed)	1888	842
Miscellaneous, under maximum fiber stress per square inch of—		
30,000 pounds, bar 6_a (heated to 700° F.)	1890	1041
35,000 pounds, bar 6_a (heated to 500° F.)	1890	1041
35,000 pounds, bar 6_a (heated to 550° F.)	1890	1041
35,000 pounds, bar 6_a (heated to 500° F.)	1890	1042
35,000 pounds, bar 7	1890	1042
40,000 pounds, bar 7 (heated to 600° F.)	1890	1042
40,000 pounds, bar 8 (kept cool)	1890	1042
40,000 pounds, bar 8	1890	1043
45,000 pounds, bar 8 (heated to 600° F.)	1890	1043
45,000 pounds, bar 8 (kept cool)	1890	1043
10,000–35,000 pounds, bar 9	1890	1044
40,000 pounds, bar 9	1890	1046
40,000 pounds, bar 9 (kept cool)	1890	1047
25,000–30,000 pounds, bar B	1888	849
35,000–40,000 pounds, bar B	1888	856
35,000 pounds, bar B	1888	858
20,000–40,000 pounds, bar B	1888	864
40,000 pounds, bar C	1888	868

Subject.	Year.	Page.
Shafts, rotating—Continued.		
Loaded on single bearing—Continued.		
Repeated stresses—Continued.		
Iron, wrought—Continued.		
Miscellaneous, under maximum fiber stress per square inch of—Continued.		
15,000–40,000 pounds, bar C	1888	872
40,000–45,000 pounds, bar C	1888	875
Muck bar, tender axle iron, under maximum fiber stress per square inch of—		
10,000–33,000 pounds	1888	831
33,000–35,000 pounds	1888	834
Tabulations	1888	886
Do	1890	1052
Do	1891	678
Do	1892	548
Steel—		
Cold drawn, under maximum fiber stress per square inch of—		
35,000 pounds	1893	451
40,000 pounds	1893	452
45,000 pounds	1893	455
50,000 pounds	1893	456
55,000 pounds	1893	457
Tabulation	1893	487
Cold rolled, under maximum fiber stress per square inch of—		
35,000 pounds	1893	441
40,000 pounds	1893	443
45,000 pounds	1893	444
55,000 pounds	1893	447
Tabulation	1893	487
Miscellaneous, under maximum fiber stress per square inch of—		
40,000 pounds	1891	677
60,000 pounds	1891	676
Tabulation	1891	678
Open hearth, under maximum fiber stress per square inch of—		
20,000–31,000 pounds, bar 1–833 (0.09 C)	1888	787
35,857 pounds, bar 2–123 (0.20 C)	1888	800
25,000–37,000 pounds, bar 2–123 (0.20 C)	1888	802
35,857–43,000 pounds, bar 3–782 (0.31 C)	1888	807
30,000–48,000 pounds, bar 4–795 (0.37 C)	1888	814
30,000–60,000 pounds, bar 5–803 (0.51 C)	1888	818
20,000–40,000 pounds, bar 6–797 (0.57 C)	1889	622
30,000–50,000 pounds, bar 7–823 (0.71 C)	1888	823
20,000–58,000 pounds, bar 8–750 (0.81 C)	1888	826
50,000 pounds, bar 9–756 (0.89 C)	1889	627
30,000–50,000 pounds, bar 10–334 (0.97 C)	1889	628
20,000–45,000 pounds, bar 4 (0.26 C)	1889	633
40,000 pounds, bar 15 (0.72 C)	1892	527
40,000 pounds, bar 20 (1.14 C)	1892	529
40,000 pounds, bar 21 (1.17 C)	1892	530
30,000–40,000 pounds, bar S 8 (0.28 C)	1892	531
Tabulation	1888	885
Do	1889	647
Do	1892	548
Open hearth, heated at intervals or cooled, under maximum fiber stress per square inch of—		
20,000–53,000 pounds, bar 1 (0.17 C)	1890	867
53,000 pounds, bar 1 (cooled during test)	1890	875, 877

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Open hearth, heated at intervals or cooled, under maximum fiber stress per square inch of—Contd.		
53,000 pounds, bar 1 (heated, 589° to 595° F., six times)	1890	879
53,000 pounds, bar 1 (heated to 595° F. four times)	1890	885
50,000 pounds, bar 2 (0.20 C)	1890	892
50,000 pounds, bar 2 (heated to 500° F. once)	1890	894
50,000 pounds, bar 2 (heated twice)	1890	897
50,000 pounds, bar 2 (heated to 500° F. six times)	1890	901, 906
45,000 pounds, bar 3 (0.21 C)	1890	912
45,000 pounds, bar 3 (heated to 500° F. six times)	1890	915, 920, 926, 931
45,000 pounds, bar 4 (0.26 C)	1890	937
45,000 pounds, bar 4 (cooled with water)	1890	938, 940
45,000–48,000 pounds, bar 5 (0.26 C) (cooled with water)	1890	942
48,000 pounds, bar 5 (heated, 150° to 180° F.)	1890	944
48,000 pounds, bar 5 (heated to 200° F.)	1890	945
48,000 pounds, bar 5 (cooled with water)	1890	946
45,000 pounds, bar 6 (0.26 C.)	1890	948
45,000 pounds, bar 6 (heated, 300° to 356° F.)	1890	949
45,000 pounds, bar 6 (heated, 344° F.)	1890	949
45,000 pounds, bar 6 (heated to 300° F. and cooled with water)	1890	950
45,000 pounds, bar 7 (0.26 C.) (heated to 300° F. and cooled with water)	1890	952
45,000 pounds, bar 7 (heated to 410° F.)	1890	953
45,000 pounds, bar 7 (heated to 700° F. and cooled with water)	1890	953
50,000 pounds, bar 15 (0.72 C.) (heated to 700° F. and cooled with water)	1890	955
50,000 pounds, bar 21 (1.17 C.) (cooled with water)	1890	957
Tabulation	1890	1050
Tensile tests—		
Iron, wrought—		
Double refined—		
Annealed	1888	838
Direct from rolls	1888	835
Unannealed	1888	836
Miscellaneous, original bar	1888	848, 866
Steel—		
Barrow rail	1904	305
Bethlehem, tabulation of mill tests	1888	597
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0.73 C	1888	598
0.82 C	1888	598
1.09 C	1888	598
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Bar 1–833	1888	783
Bar 2–123	1888	799
Bar 3–782	1888	806
Bar 4–795	1888	813
Bar 5–803	1888	817

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Bar 6–797	1889	621
Bar 7–823	1888	821
Bar 8–750	1888	825
Bar 9–756	1889	621
Bar 10–334	1889	621
Partially ruptured in rotating apparatus—		
Tensile tests—		
Iron, cast	1889	621
Iron, wrought—		
Double refined—		
Annealed	1888	841
Unannealed	1888	840
Miscellaneous	1888	848,59, 63, 66,69
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Bar 1–833	1888	786
Bar 2–123	1888	799
Bar 3–782	1888	806
Bar 4–795	1888	813
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Steel—		
Bethlehem—		
Annealed—		
0.24 C	1902	325
0.42 C	1902	323
0.26 C., 3.282 Ni	1902	317
Oil hardened and annealed—		
0.24 C	1902	327
0.46 C	1902	321
0.66 C	1902	333
0.26 C, 3.282 Ni	1902	319
0.25 C, 4.514 Ni	1902	331
0.29 C, 5.661 Ni	1902	329
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Untreated	1893	491, 508
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0.16 C	1894	579
Do	1895	602
0.17 C	1894	593
Do	1895	613
0.34 C	1894	609
Do	1895	619
0.55 C	1895	637
0.73 C	1895	659

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0.82 C	1895	673
1.09 C	1895	685
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Do	1895	600, 697, 701
Open hearth, bar S8	1892	561
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Cast iron	1892	556
Tabulation	1892	584
Wrought iron—		
Burdens	1890	1072
Tabulation	1890	1095
Burdens Best	1903	377
Tabulation	1903	380
Cold rolled	1892	554
Tabulation	1892	584
Miscellaneous	1891	699
Tabulation	1891	719
Steel—		
Bethlehem—		
Annealed—		
0.24 C	1902	289
0.42 C	1902	287
0.46 C	1902	285
0.66 C	1902	295
0.26 C, 3.282 Ni	1902	281
0.25 C, 4.514 Ni	1902	293
0.29 C, 5.661 Ni	1902	291
0.539 C, 27.353 Ni	1902	283
Oil hardened and annealed—		
0.24 C	1902	290
0.42 C	1902	288
0.46 C	1902	286
0.66 C	1902	296
0.26 C, 3.282 Ni	1902	282
0.25 C, 4.514 Ni	1902	294
0.29 C, 5.661 Ni	1902	292
0.539 C, 27.353 Ni	1902	284
Annealed at low heat—		
0.25 C, 4.60 Ni	1902	302
Do	1903	356
0.26 C	1901	641
0.26 C, 3.31 Ni	1902	310
0.29 C	1903	361, 362
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0.25 C, 4.60 Ni	1902	314
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0.26 C, 3.31 Ni	1902	305, 311
Hardened—		
0.25 C, 4.60 Ni	1903	354
0.26 C	1901	643
0.26 C, 3.31 Ni	1903	355

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Natural state	1902	304
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Heated white hot and quenched in brine	1903	365
Heated bright yellow and quenched in oil	1903	366
Heated bright yellow, quenched in oil, and annealed	1903	367
Heated bright yellow and cooled in sand	1903	368
Heated bright red and quenched in oil	1903	369
Oil tempered and annealed	1902	307
Tabulations	1902	316
Do	1903	370
Gautier—		
0.16 C	1894	494
Do	1901	637
0.17 C	1894	495
Do	1901	640
0.34 C	1894	496
Do	1901	639
Do	1905	266, 67, 7
0.55 C	1894	497
Do	1901	638
Do	1905	265
0.73 C	1894	498
Do	1902	300
Do	1905	268, 69, 73
0.82 C	1894	499
Do	1902	297, 301
1.09 C	1894	500
Do	1902	299
Do	1905	270, 71, 80, 81
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Annealed	1905	275
Heated to first red and quenched in oil	1905	276
Heated to low yellow and quenched in oil	1905	277
Heated to low yellow and quenched in water	1905	278
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Tabulation	1905	282
Nickel steel ingot, 0.17 C, 3.25 Ni—		
Natural state	1902	303
Do	1903	371
Heated low cherry and quenched in oil	1903	375
Heated white hot and quenched in brine	1903	372
Heated bright yellow and quenched in oil	1903	373
Heated bright yellow and cooled in sand	1903	374
Oil tempered and annealed	1902	306
Tabulation	1902	315
Do	1903	376
Open hearth—		
Bar 1	1890	1057
Do	1891	681
Bar 2	1890	1061
Do	1891	682
Bar 3	1890	1063
Do	1891	684
Bar 4	1890	1064
Do	1891	688
Bar 5	1890	1068
Bar 6	1891	692
Bar 7	1891	695
Bar 20	1892	553
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Cammell, 1872, toughened	1903	380, 381
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Carnegie	1905	274
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To obtain elastic limit—		
Gautier—		
0.15 C.	1894	484
0.17 C.	1894	485
0.34 C.	1894	485
0.55 C.	1894	486
0.73 C.	1894	488
0.82 C.	1894	490
1.09 C.	1894	492
To show mechanical work necessary to produce rupture—		
Gautier—		
0.17 C.	1904	306
0.34 C.	1905	283
0.55 C.	1904	307
0.73 C.	1905	285
0.82 C.	1904	308
1.09 C.	1905	287
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Analysis, chemical	1894	429
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3-inch	1899	639, 640
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3.2-inch	1896	224
Do	1898	366
Do	1899	639
5-inch	1897	279
7-inch	1895	179
8-inch	1893	284
10-inch	1895	179
12-inch	1894	250
Do	1896	223
Do	1898	365
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12-inch mortar	1892	459, 460, 615
Do	1893	283
Shot—		
8-inch	1894	250
Do	1895	179
Do	1898	365
Cored	1893	283
Round (old)	1892	615
Solid	1893	283

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Shot—Continued.		
10-inch	1893	283
Do	1894	250
Do	1895	179
Round (old)	1896	432
12-inch	1893	283
Do	1895	179
Do	1899	641, 642
Watertown Arsenal	1892	459, 460, 615
Do	1893	283, 284
Do	1894	250
Do	1895	179
Do	1896	223, 224, 432
Do	1897	279
Do	1898	365, 366
Do	1899	639–643
Do	1902	61
Compression tests—		
3.2-inch shell	1885	709
Do	1898	269
4.2-inch shot	1885	709
Do	1886	1260
5-inch shell	1888	744
Do	1898	267, 274
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7-inch shot	1888	746
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Do	1895	179
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Do	1902	61
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Do	1890	737
Do	1895	179
Do	1896	224
Do	1898	365, 395
Do	1899	639, 645
Do	1901	373
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4-inch shell	1889	646
4.2-inch shell	1885	709
5-inch shell	1888	743
Do	1897	279
Do	1898	366
6-inch shell	1899	640
6-inch shell, from Fort Revere	1910	74
6-inch R. F. shell	1900	1046
6-inch shot	1898	366
7-inch shell	1895	162, 165, 179
Do	1896	223
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7-inch shot	1888	743
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8-inch shot	1885	701
Do	1887	989
Do	1893	283
Do	1894	250
Do	1895	165, 179
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Do	1897	279
Do	1898	365
Do	1899	639
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Do	1901	373
Do	1902	63
8-inch shell	1893	284
Do	1895	179
Do	1896	224
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Do	1901	373
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12-inch shot	1891	292
Do	1893	283
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Do	1896	223
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Do	1902	63
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Berry, soap; wild china tree	Sapindus marginatus	1883	665
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Betula occidentalis	Betula occidentalis	1883	658
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Cedar, white	Thuja occidentalis	1883	659
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Ceresa, Mexican	Prunus Capuli	1883	659
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Cotton tree	Populus heterophylla	1883	660
Cottonwood	Populus Freemontii	1883	660
Cottonwood	Populus Freemontii, var. Wislezeni	1883	660
Cottonwood	Populus monilifera	1883	660
Cottonwood	Populus trichocarpa	1883	660
Crab apple, American	Pirus coronaria	1883	660
Cucumber tree	Magnolia acuminata	1883	660
Cucumber tree	Magnolia cordata	1883	660
Cucumber tree, long-leaved	Magnolia Fraseri	1883	660
Cupressus Goveniana	Cupressus Goveniana	1883	660
Cupressus Macnabiana	Cupressus Macnabiana	1883	660
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Dogwood	Cornus florida	1883	660
Dogwood, Jamaica	Piscidia Erythrina	1883	660
Ehretia elliptica	Ehretia elliptica	1883	660
Elder	Sambucus glauca	1883	660
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Elder, box; Maple, soft	Negundo Californicum	1883	659
Elm, Cedar	Ulmus crassifolia	1883	660
Elm, Rock; Elm, American Cork.	Ulmus racemosa	1883	660
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Elm, Water	Planera aquatica	1883	660
Elm, White; Elm, Water	Ulmus Americana	1883	660
Exostemma caribaeum	Exostemma caribaeum	1883	660
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Fir, Red; Fir, Yellow	Pseudotsuga Douglasii, var. macrocarpa.	1883	660
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Haw, Black	Viburnum prunifolium	1883	659
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Holly, Dahoon	Ilex Dahoon	1883	661
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Ironwood	Condalia ferrea	1883	661
Ironwood	Olneya Tesota	1883	661
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Islay	Prunus ilicifolia	1883	661
Jack, Black	Quercus nigra	1883	659
Jack, Blue	Quercus cinerea	1883	659
Juglans rupistris	Juglans rupistris	1883	661
Juniper	Juniperus occidentalis	1883	661
Larix occidentalis	Larix occidentalis	1883	661
Laurel; Calico Bush; Spoonwood; Ivy.	Kalmia latifolia	1883	661
Laurel, Big	Rhododendron maximum	1883	658
Laurel, Big; Bay, Bull	Magnolia grandiflora	1883	661
Leather wood	Cyrilla racemiflora	1883	661
Lignum-vitae	Guaiacum sanctum	1883	661
Lime, Ogeechee; Tupelo, Sour	Nyssa capitata	1883	663
Locust; Locust, Yellow	Robinia pseudacacia	1883	662
Locust, Honey	Gleditschia triacanthos	1883	662
Locust, Water	Gleditschia monosperma	1883	662
Madeira Wood; Berry, Honey	Hyplate paniculata	1883	662
Madrona	Arbutus Menziesii	1883	662
Magnolia Tree, Large-leaved	Magnolia macrophylla	1883	662
Mahogany	Swietenia mahogoni	1883	662
Mahogany, Mountain	Cercocarpus ledifolius	1883	662
Mangrove	Rhizophora Mangle	1883	662
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Maple, Black	Acer saccharinum, var. nigrum	1883	662
Maple, Oregon	Acer macrophyllum	1883	662
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Maple, Sugar; Maple, Rock	Acer saccharinum	1883	662
Maple, Vine	Acer circinatum	1883	662
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Meskit; Locust, Honey	Prosopis juliflora, Algaroba	1883	662
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Myrica Californica	Myrica Californica	1883	662
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Oak, basket; oak, cow	Quercus Michauxii	1883	662
Oak, black	Quercus Kelloggii	1883	663
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Oak, chestnut	Quercus prinus	1883	662
Oak, chinquapin; oak, yellow	Quercus prinoides	1883	663
Oak, evergreen white; oak, live	Quercus oblongifolia	1883	663
Oak, laurel	Quercus laurifolia	1883	663
Oak, live	Quercus virens	1883	663
Oak, mountain white; oak, blue	Quercus Douglasii	1883	663
Oak, over-cup; oak, water white	Quercus lyrata	1883	662
Oak, pin; oak, Spanish swamp	Quercus palustris	1883	663
Oak, post	Quercus obtusiloba	1883	662
Oak, red	Quercus rubra	1883	663
Oak, scarlet	Quercus coccinea	1883	663
Oak, shingle; oak, laurel	Quercus imbricaria	1883	663
Oak, Spanish; oak, red	Quercus falcata	1883	663
Oak, turkey; oak, scrub	Quercus Catesbaei	1883	663
Oak, water	Quercus aquatica	1883	663
Oak, white	Quercus alba	1883	662
Oak, white, swamp	Quercus bicolor	1883	662
Oak, white; oak, basket	Quercus Durandii	1883	663
Oak, white	Quercus Garryana	1883	662
Oak, white	Quercus grisea	1883	663
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Orange, osage; Bois d'Arc	Maclura aurantiaca	1883	663
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Pine, scrub	Pinus contorta	1883	663
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Pine, spruce	Pinus glabra	1883	664
Pine, sugar	Pinus Lambertiana	1883	663
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Pine, white	Pinus monticola	1883	663
Pine, white	Pinus reflexa	1883	663
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Pine, yellow	Pinus Arizonica	1883	663
Pine, yellow	Pinus mitis	1883	664
Pine, yellow	Pinus ponderosa	1883	663
Pinus albicaulis	Pinus albicaulis	1883	663
Pinus Chihuahuana	Pinus Chihuahuana	1883	663
Pinus contorta, var. Murayana	Pinus contorta, var. Murayana	1883	663
Pinus inops, var. clausa	Pinus inops, var. clausa	1883	664
Pinus insignis	Pinus insignis	1883	663
Pinus Jeffreyi	Pinus Jeffreyi	1883	663
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Pinus Parryana	Pinus Parryana	1883	663
Pinus Torreyana	Pinus Torreyana	1883	663
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Pisonea obtusa	Pisonea obtusa	1883	664
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Plum, Darling	Reynosia latifolia	1883	660
Plum, downward	Bumelia cuneata	1883	660
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Plum, hog	Prunus umbellata	1883	664
Plum, pigeon	Coccoloba Floridana	1883	664
Plum, wild; plum, Canada	Prunus Americana	1883	664
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Sumac	Rhus copallina, var. lanceolata	1883	665
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Thorn, Cockspur	Crataegeus crus-galli	1883	665
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